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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Karell
Serial No.: 09/844,938
Filed: 04/27/2001
Group Art Unit: 2833
Examiner: Ta, Tho Dac
Title: ELECTRIC CONNECTION FOR FUEL INJECTORS

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APPEAL BRIEF

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Assistant Commissioner of Patents
Washington, D.C. 20231

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Dear Sir:

The Notice of Appeal in this application was filed on October 29, 2002. Appellant now submits its brief in the above-referenced application. A check in the amount of \$320.00 is enclosed accompanying this brief.

Real Party in Interest

Siemens VDO Automotive, Inc. is the real party in interest.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of the Claims

Claims 1-17 stand finally rejected. Claims 1-5 and 10-15 were rejected under 35 U.S.C. §103 over a combination of two references while claims 6-9, 16 and 17 were rejected under 35 U.S.C. §103 over a combination of three references.

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Status of Amendments

There are no unentered amendments. The claims appearing in the Appendix of Claims include the amendments made in response to the first Office Action.

Summary of the Invention

Fuel injectors are used as part of the arrangement for providing fuel to an internal combustion engine in modern vehicles. Electrical connections with the appropriate portions of fuel injectors must establish the desired electrical contact in a manner that remains reliable throughout the expected service life of the vehicle fuel system. (Page 1, paragraph 3).

There are a variety of problems associated with conventional connection methods used for establishing electrical connections with fuel injector components. Typical connectors have an outer shell and a plurality of male pins that cooperate with a set of female connectors. Typical connector housings shield these pins from view once an attempted connection is made so that visual inspection is not possible. One difficulty associated with that situation is that the male or female connector parts may become bent or distorted before or during the attempted connection. Further, conventional connectors do not always provide a secure connection that lasts over the service life of the fuel system. (Page 1, paragraph 4).

The inventive fuel injector connection arrangement includes an electrical connection interface 24 that has at least one connector member 26 that facilitates making a reliable, visually observable electrical connection with a fuel injector. A support portion 30 of the connection interface 24 receives and supports a portion of a conductor 28 during an assembly process. The connector members 26 preferably are deformed so that at least one portion of each connector member penetrates through an insulation layer 32 on the conductor 28 and forms an electrical coupling with a conductive portion 34 of the conductor 28. (Pages 2-3, paragraph 15-16).

In one example, the connector members 26 are barbs with pointed edges that pierce through the insulation layer 32 and engage the conductive portion 34. In one example arrangement, the connector members 26 are crimped into an electrically connected, conductive position. The electrical connection further makes a secure physical connection between the connection interface 24 and the conductor 28. (Page 3, paragraph 16).

Some example arrangements designed according to this invention include a covering 50 that covers over the connecting interface 24 and an associated portion of the conductor 28. One example covering 50 comprises molded plastic that is applied after the appropriate electrical connection has been made. Another example covering 50 is a seal that covers the connecting interface and provides a seal along the associated region of the fuel injector body 22 to prevent any contaminants from entering an opening in the body portion 22 adjacent the interface 24, where electrical connections to one or more components housed within the fuel injector body are made. The covering 50 prevents wear or deterioration over time due to environmental exposure. (Page 3, paragraph 17).

Independent claim 1 recites a fuel injector assembly having a body portion that houses fuel injector components and an electrical interface portion supported by the body. At least one deformable connector member is supported on the interface portion and has at least one edge that is adapted to penetrate an insulation covering on an electrical conductor to thereby electrically couple the connector portion to the electrical conductor.

Independent claim 4 recites the combination of the deformable connector member supported on the interface portion and the conductor. Claim 4 specifically recites in part, “the deformable connector member having at least one edge that is penetrated through the insulation covering and making electrical contact with the electrical conductor.”

Independent claim 12 recites a method of making an electrically conductive connection that includes, “deforming the deformable connector member to establish an electrically conductive connection between the electrical interface and the conductor.”

The various dependent claims add further structural and method limitations.

Issues

Whether the final rejections under 35 U.S.C. §103 are proper where there is no suggestion or motivation to make the combinations proposed by the Examiner because there is no benefit to be gained from the proposed combination and the Examiner’s proposal defeats the intended operation of the teachings of the primary reference.

Grouping of Claims

The rejections of claims 1-17 are contested.

Claims 1-5 and 10-15 were rejected under 35 U.S.C. §103 based upon the combination of the *Treusch, et al.* and *Kinkaid, et al.* references.

Claims 1-3, 10 and 11 stand or fall together for purposes of this appeal. Claims 4-5 stand or fall together but are separately patentable from the other claims. Claims 12-14 stand or fall together but are separately patentable from the other claims. Claim 15 stands alone.

Claims 6-9, 16 and 17 were rejected under 35 U.S.C. §103 over the combination of the *Treusch, et al.*, *Kinkaid, et al.* and *Kamon, et al.* references. Claims 6-9 stand or fall together for purposes of this appeal. Claims 16 and 17 stand or fall together but are separately patentable from the other claims.

Argument

INTRODUCTION

There is no *prima facie* case of obviousness for a rejection under 35 U.S.C. §103 because there is no motivation for making the Examiner's proposed combination. There is no benefit to making the proposed combination and, further, the Examiner's proposal defeats the intended operation of the teachings of the primary reference relied upon by the Examiner.

THE CITED REFERENCES

A. United States Patent No. 5,598,824 ("the *Treusch* reference")

The *Treusch* reference discloses an arrangement where a molded plastic fuel rail includes a locking device that operates to mechanically lock the fuel injector in position while simultaneously making an electrical connection. An object of the teachings of the *Treusch* reference, "is to provide a plastic molded fuel rail for simultaneously retaining, orienting and electrically connecting a fuel injector to the rail." (Column 1, lines 52-54). The *Treusch* reference also explicitly states, "An advantage of the present invention is that fuel injectors may be easily mounted to a fuel rail such that both mechanical retention and orientation, as well as electrical connection, may be accomplished during a single assembly step." (Column 2, lines 10-13). Accordingly, the *Treusch* reference relies upon a system where mechanical and electrical connection between a fuel injector

and a plastic molded fuel rail simultaneously makes an electrical and mechanical connection between those parts. One problem with the Examiner's proposed modification to the *Treusch* reference is that it eliminates the possibility for the *Treusch* reference to accomplish what it teaches.

More specifically, the *Treusch* reference teaches an arrangement having a locking tab 56, a locking tongue 58 and an opening 60 that are mechanically locked when the fuel rail 18 is connected with the fuel injector 20. This mechanical locking also establishes an electrical connection such that the electrical connection cannot come loose unless the entire fuel injector comes loose from the rail. The electrical connection between the connectors 69 and 70 are made simultaneously with the fuel injector being secured into the fuel rail so that the locking arrangement of the *Treusch* reference (according to the teachings of that reference) locks the electrical and mechanical connections simultaneously.

B. United States Patent No. 4,082,402 ("the *Kinkaid* reference")

The *Kinkaid* reference shows a flat flexible cable terminal and electrical connection arrangement that requires a pair of dies 20 and 22 to make the electrical connection provided by the *Kinkaid* reference. The manner in which the *Kinkaid* reference achieves the electrical connection is important because utilizing such dies to make an electrical connection eliminates the possibility for having a simultaneous electrical and mechanical connection as taught by the *Treusch* reference.

C. United States Patent No. 5,326,273 ("the *Kamon* reference")

The *Kamon* reference is cited by the Examiner for showing a molded plastic water-proof layer 3 associated with a ground wire connection for a vehicle electrical system. This reference is used in the rejection of claims 6-9, 16 and 17, which include limitations regarding a seal member associated with Applicant's inventive fuel injector electrical connection arrangement.

THE REJECTIONS UNDER 35 U.S.C. §103

The Examiner has rejected claims 1-5 and 7-15 over the combination of the *Treusch* reference and the *Kinkaid* reference. The Examiner properly acknowledges that the *Treusch* reference does not disclose at least one connector member that is a deformable connector member having at least one edge that is adapted to penetrate an insulation covering on an electrical conductor. The Examiner improperly reasons, however, that it follows that the electrical

connection between the connector member 70 and the male conductor 69 of the *Treusch* reference “would become loose or disconnected due to vibration.” The Examiner then proposes to modify the teachings of the *Treusch* reference by including the teachings of the *Kinkaid* reference (in order to provide a reliable electrical connection for the fuel injector assembly).

The Examiner has rejected claims 6-9, 16 and 17 over the combination of the *Treusch* and *Kinkaid* references with the further addition of the *Kamon* reference. The Examiner contends that it would be obvious to add a securing member as taught by *Kamon* (i.e., the water-proof layer 3) as a modification to the teachings of the *Treusch* reference (in order to provide a water-proof layer at the connection portion between the conductor and the connector member).

THE REJECTIONS UNDER 35 U.S.C. §103 ARE IMPROPER

It is axiomatic that there must be a motivation to make a modification to a reference or a combination of references when attempting to establish a *prima facie* case of obviousness. Where there is no benefit to making a proposed combination or the proposed modification defeats an intended purpose of the teachings of the primary reference, there is no motivation and no *prima facie* case of obviousness. In this case, there is no motivation because there is no benefit to making the Examiner’s proposed combination. Moreover, making the Examiner’s proposed combination necessarily eliminates an intended feature and function of the teachings of the primary reference. Because there is no motivation, there is no *prima facie* case of obviousness.

The Examiner proposes modifying the teachings of the *Treusch* reference to incorporate the connector of the *Kinkaid* reference. The Examiner’s alleged motivation for doing so is to establish an electrical connection that will not become loose due to vibration. The *Treusch* reference, however, specifically teaches a mechanical locking arrangement that simultaneously establishes an electrical connection and secures a fuel injector to a rail. If the mechanical connection of the *Treusch* reference were to fail, the entire fuel injector would be separated or separable from the rail. There is no indication, whatsoever, that the mechanical locking arrangement of the *Treusch* reference is subject to becoming loose because of vibration. The Examiner has imagined that possibility and reasoned that the substitution of the arrangement as shown in the *Kinkaid* reference would remedy that alleged difficulty only after having the benefit of Applicant’s disclosure and claims.

The Examiner has pointed to no teaching in the *Treusch* reference that would have led the ordinarily skilled artisan to believe that the *Treusch* arrangement for securing an electrical connection associated with a fuel injector is in any way deficient for *Treusch*'s purposes or is in need of modification. One skilled in the art would have found no reason, suggestion or incentive for attempting to combine the *Treusch* and *Kinkaid* references in a manner such that they would arrive at Appellant's claimed invention other than through the luxury of hindsight accorded to one who first viewed Appellant's disclosure. This, of course, is not a proper basis for a rejection under 35 U.S.C. §103.

The rejection of claims 1-5 and 10-15 must be reversed because there is no motivation for making the combination and, therefore, no *prima facie* case of obviousness because there is no benefit to the proposed combination. *Treusch* already has a secure mechanical and electrical connection feature that is especially well-suited to accomplish *Treusch*'s stated objectives.

Further, there is no *prima facie* case of obviousness because the Examiner's proposed combination defeats an intended feature and function of the teachings of the *Treusch* reference.

The *Kinkaid* reference teaches an arrangement that relies upon dies 20 and 22 for establishing an electrical connection. The *Treusch* reference desires to establish an arrangement where mechanical locking of a fuel injector to a molded rail occurs simultaneously while making an electrical connection. If one were to attempt to use the *Kinkaid* arrangement, which relies upon the dies 20 and 22, the simultaneous mechanical and electrical connection feature of the *Treusch* reference would be lost. One cannot snap the fuel injector into the *Treusch* rail and simultaneously achieve the *Kinkaid* electrical connection. Two separate and necessarily sequential operations would be needed. Accordingly, the Examiner's proposed combination defeats an intended feature and function of the teachings of the *Treusch* reference. Where a proposed combination defeats an intended feature or function of the primary reference or somehow renders a portion of the primary reference inoperative, there is no motivation and no *prima facie* case of obviousness.

The rejection of claim 6-9, 16 and 17 must be reversed for the same reasons. The Examiner's combination begins with the *Treusch* and *Kinkaid* references, which cannot properly be combined as discussed above. The further addition of the teachings of the *Kamon* reference do not remedy the defect in the Examiner's proposed combination. Further, it is not conceivable how one would be led to believe that the plastic water-proof layer 3 of the *Kamon* reference would have any use in the arrangement of the *Treusch* reference where the electrical connection is made in a manner

that is already covered by plastic. There is no benefit to making the further addition of the teachings of the *Kamon* reference to further modify the *Treusch* reference. The Examiner has not pointed to any teaching within the *Treusch* reference that indicates that it is susceptible to water intrusion such that one skilled in the art would be led to believe that a water-proof layer such as that provided by the *Kamon* reference would be useful or beneficial in association with the arrangement disclosed in the *Treusch* reference.

There is no motivation for making the Examiner's proposed combinations and, therefore, the rejections under 35 U.S.C. §103 must be reversed. There is no *prima facie* case of obviousness because the required legal motivation is absent.

CLAIMS 1-3 ARE ALLOWABLE

Independent claim 1 includes, in part, "at least one deformable connector member supported on the interface portion...having at least one edge that is adapted to penetrate an insulation covering on an electrical conductor to thereby electrically couple the connector portion to the electrical conductor." There is no motivation to modify the teachings of the *Treusch* reference in a manner that would suggest including such a connector member and, therefore, claims 1-3 cannot be considered obvious.

CLAIMS 4-5 AND 10-11 ARE ALLOWABLE

Independent claim 4 includes, in part, "at least one deformable connector member...at least one conductor having an insulation covering on a conductive portion, the deformable connector member having at least one edge that is penetrated through the installation covering and making electrical contact with the electrical conductor." Such a fuel injector electrical connection arrangement is not fairly suggested by the cited references. There is no motivation for making the Examiner's proposed modification to the *Treusch* reference because the Examiner's proposed combination provides no benefit and defeats an intended feature and function of the teachings of the *Treusch* reference. Claims 4-5 and 10-11 cannot be considered obvious.

CLAIMS 12-14 ARE ALLOWABLE

Independent claim 12 includes the method step of "deforming the deformable connector member to establish an electrically conductive connection between the electrical interface and the

conductor.” Claims 12-14 are allowable because the Examiner has failed to establish a *prima facie* case of obviousness as discussed above.

CLAIM 15 IS ALLOWABLE

Claim 15 includes “covering the deformable connector member and an associated portion of the conductor after performing the deforming step.” Providing a covering as recited in claim 15 is useful with an arrangement that establishes an electrical connection as recited in claim 12. However, providing a covering at a later time has no benefit in the *Treusch* reference where the mechanical and electrical connections are made simultaneously and the electrical connections are already covered by plastic components as shown in that reference. There is no suggestion or motivation for making the further modification of the *Treusch* reference with the teachings of the *Kamon* reference as suggested by the Examiner.

CLAIMS 6-9 ARE PATENTABLE

Claim 6 includes “a securing member placed over the conductor and the connector member.” These claims cannot be considered obvious for the same reasons claim 4 is not obvious and because there is no motivation to add a water-proof layer 3 as taught by the *Kamon* reference to the teachings of the *Treusch* reference. The *Treusch* reference already teaches an arrangement where an electrical connection is made within a plastic housing simultaneously with securing a fuel injector to a plastic molded rail. Further limitations of claims 7-9 are not suggested, either. Because there is no benefit to making the Examiner’s proposed combination, there is no *prima facie* case of obviousness and these claims cannot be considered obvious.

CLAIMS 16 AND 17 ARE ALLOWABLE

Claims 16 and 17 recite method steps that are different ways of covering over the connection made according to claim 15. As discussed above, there is no motivation for combining the cited references in a manner that would result in performing the method of claims 16 and 17. Therefore, neither of these claims can be considered obvious.

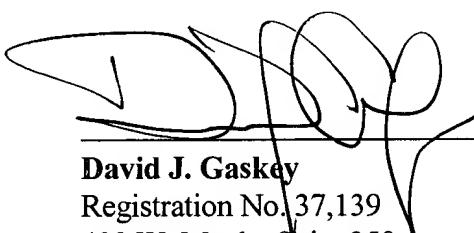
CONCLUSION

There is no *prima facie* case of obviousness because there is no motivation for making the Examiner's proposed combination. The combination is not proper and cannot be made because there is no benefit to making the combination and if one were to combine the references as suggested by the Examiner, a primary feature of the primary reference would be defeated or eliminated. The rejections must be reversed. All claims are allowable.

Respectfully solicited,

CARLSON, GASKEY & OLDS, P.C.

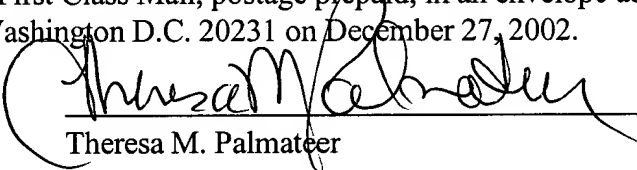
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CERTIFICATE OF MAIL

I hereby certify that the enclosed **Appeal Brief (in triplicate) and Fees** is being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Assistant Commissioner of Patents, Washington D.C. 20231 on December 27, 2002.



Theresa M. Palmateer

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APPENDIX OF CLAIMS

1. A fuel injector assembly, comprising:
a body portion that houses fuel injector components;
an electrical interface portion supported by the body portion; and
at least one deformable connector member supported on the interface portion, the deformable connector member having at least one edge that is adapted to penetrate an insulation covering on an electrical conductor to thereby electrically couple the connector portion to the electrical conductor.
2. The assembly of claim 1, including a plurality of connector members, each comprising a barb of flexible metal material.
3. The assembly of claim 1, wherein the electrical interface portion at least partially extends outwardly and away from the body portion and the deformable connector member is outside of the body portion.
4. A fuel injector assembly, comprising:
a body portion that houses fuel injector components;
an electrical interface portion supported by the body portion;
at least one deformable connector member supported on the interface portion; and
at least one conductor having an insulation covering on a conductive portion, the deformable connector member having at least one edge that is penetrated through the insulation covering and making electrical contact with the electrical conductor.
5. The assembly of claim 4, including a plurality of connector members, each comprising a barb of flexible metal material.
6. The assembly of claim 4, including a securing member placed over the conductor and the connector member.

7. The assembly of claim 6, wherein the securing member comprises plastic that is molded over the conductor and the connector member.
8. The assembly of claim 6, wherein the securing member comprises a seal.
9. The assembly of claim 6, wherein the securing member comprises at least one material selected from the group consisting of plastic, foam or silicone.
10. The assembly of claim 4, wherein the conductor comprises a flexible conductor cable.
11. The assembly of claim 4, including a plurality of conductors and a corresponding plurality of deformable connector members.
12. A method of making an electrically conductive connection between an electrical interface on a fuel injector that has at least one deformable connector member and an electrical conductor, comprising the steps of:
 - positioning a portion of the conductor near the deformable connector member; and
 - deforming the deformable connector member to establish an electrically conductive connection between the electrical interface and the conductor.
13. The method of claim 12, including crimping the deformable member onto the conductor.
14. The method of claim 12, including at least partially penetrating the conductor with a portion of the deformable connector member to establish an electrically conductive coupling through the deformable connector member.
15. The method of claim 12, including covering the deformable connector member and an associated portion of the conductor after performing the deforming step.

16. The method of claim 15, including molding a plastic material onto the connector member and the associated portion of the conductor.

17. The method of claim 15, including placing a seal over the connector member and the associated portion of the conductor.

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